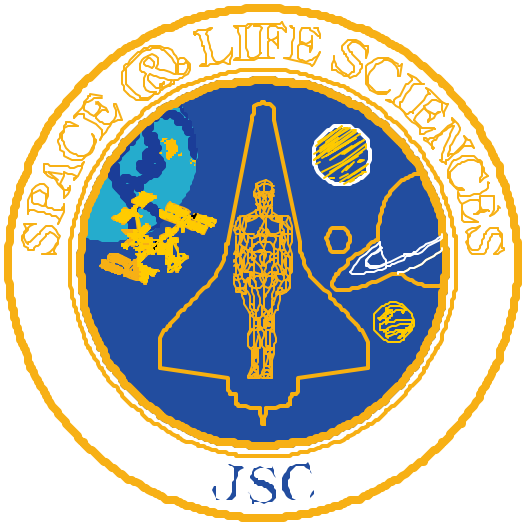
Advanced Technology Management

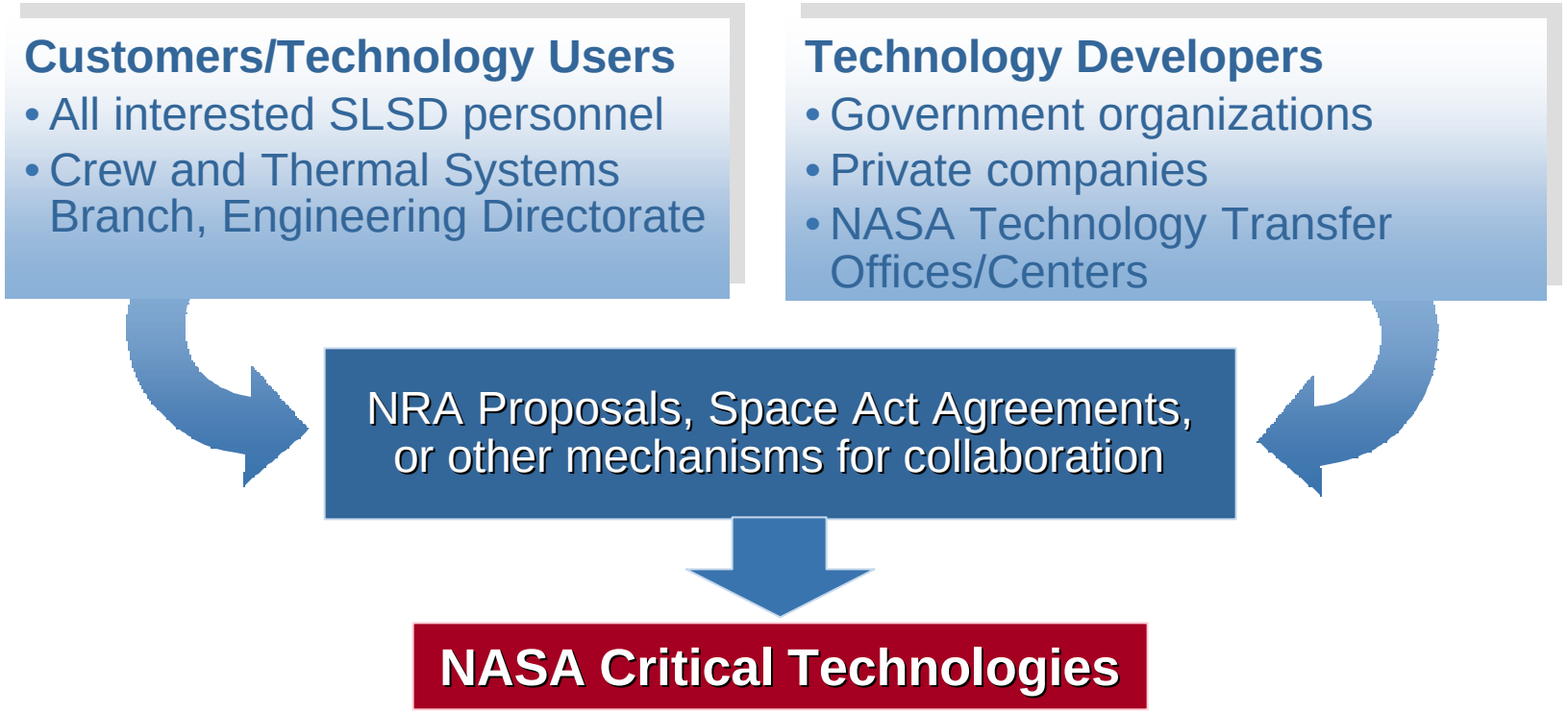


The Advanced Technology Management (ATM) team facilitates the identification and development of critical path technologies.

Don Stilwell, Alyssa Mueller, and Terri Gilbert
ATM Team for Space and Life Sciences

APPROACH

- Technologies can be developed without a budget only by leveraging
- The best way to leverage is to team our scientists with the appropriate technology developers
  - Possible partners include other NASA Centers, industry, DOE, DOD, NIH, DARPA, NSF, the National Labs, NSBRI, and academia
  - Resulting teams may then submit proposals or enter into Space Act Agreements



- Such proposals have a high rate of selection because of their quality and responsiveness to our needs
- This allows NASA scientists/researchers (acting as user representatives) to affect the development of many, many technologies without investing significant amounts of time
- The actual technology development is not done in-house and, in most cases, does not use in-house resources

Successes

ATM has facilitated the creation of many technology development teams.

- **Five joint JPL/JSC Proposals were generated for NRA 99-HEDS-02 and NRA 99-HEDS-03 (no selections yet) :**
  - Intuitive Haptic Cyber-Glove for Planetary Tele- and Virtual- OperationsMicroarray Bioinformatics for Microgravity Muscle Atrophy
  - Sterilization of water and air using iron in its higher oxidation state bound by inorganic polymer phases
  - Miniature On-Line Capillary Electrophoresis-Mass Spectrometry of Organic Compounds
  - Next generation instrument for detection of volatiles in cabin air
- **Three funded Cross Enterprise Development Program (CEDP) projects:**
  - Astrophysics Sensor Applied to Ultra-high Resolution DEXA and SPECT Imaging
  - MEMS pH Sensor System for the In-Situ Analysis of Liquid Environments
  - Large Arrays of Superconducting Transition Edge Sensor (TES) Calorimeters and Bolometers
- **One funded Biologically Inspired Technology project:**
  - A Dynamic Human-Machine Interface
- **Two Space Act Agreements currently in negotiation**
  - Collaborative effort between a major equipment manufacturer providing company equipment, expertise, etc., to our research program
- **Multiple proposals (no selections yet) to the latest CETDP and NSBRI Smart Medical Systems NRA:**
  - Two proposals to CETDP and NSBRI on Autonomous Trauma Care System
  - Two proposals to CETDP and NSBRI on Medical Robotics
  - One proposal to NSBRI on the ISS Flight Surgeon's Console Interface
  - CETDP proposal -- Microfabricated devices for biochemical analyses and aerospace applications

ITEM 1: Site Visits

WHY VISIT?

- The ATM team proposes site visits by representatives of the SD/Medical Sciences Division and other interested parties (SF, SN, etc.) to:
  - Oak Ridge National Labs (ORNL, part of DOE)
  - National Institute of Standards and Technology (NIST)
  - Medical Research and Materiel Command, Fort Detrick (MRMC)
- The goal for all trips is to **identify mature or critical technologies for JSC**
  - Mature technologies (TRL 7-9) that can be integrated into JSC research or upcoming NRA proposals
  - Critical technologies in development (TRL 5-6) that can benefit JSC
  - Conceptual or in-work technologies (TRL 1-3) that can be monitored for future applications
- These selected technologies may be incorporated into proposals for the recently released NIH/NASA NRA [http://grants.nih.gov/grants/guide/pa-files/PA-00-088.html], which
  - emphasizes ground-based, space life sciences research; JSC proposers will seek mature technologies and capabilities beyond our areas of expertise
  - does not require technology development *per se*, although JSC might be willing to join with these government labs to propose some technology development

ITEM 1: Site Visits

WHY NIST? WHY ORNL?

- NIST has a very large Biotechnology Division with capabilities that complement our own [http://www.cstl.nist.gov/biotech/biotech.html].
- NIST capabilities in Biotechnology include:
  - DNA chemistry, sequencing, and profiling
  - Protein structure determination, properties, and modeling
  - Biomaterials, biosensors, and bioelectronics
  - Biocatalysis, bioprocessing measurements, and separations technologies

- ORNL has
  - considerable expertise in instrument design and measurement system
  - a Life Sciences group [http://lsd.ornl.gov/]

OAK RIDGE NATIONAL LABORATORY

- ORNL suggests the following labs and technologies:
  - Biosensors and nanosensors
  - Microcantelever environmental & biosensors
  - Active radiation dosimeter
  - Health monitoring chip
  - Functional genomics
  - Haz gas specific mass specs
  - Wireless ASIC chips & physical measurements
  - Membrane technology
  - Microbial systems & biomolecular electronics
  - Microbial H_2,O_2 production, CO_2 absorption
  - Lab-on-a-Chip
  - Virtual Human

ITEM 1: Site Visits

WHY MRMC?

- MRMC [http://mrmc-www.army.mil/researchAreas/index.htm] is conducting several research programs that are complementary to JSC interests, including an advanced technology research center
- MRMC facilities include:
  - Combat Casualty Care
  - Operational Medicine
  - Medical Chemical and Biological Defense
  - Telemedicine and Advanced Technology Research Center (TATRC)
  - US Army Medical Research Institute of Infectious Diseases (USAMRIID)
  - MRMC Headquarters

WHEN?

- Site visits should be initiated in June 2000, with sufficient time allowed for travel planning
  - ORNL visit is slated to occur June 22-23
  - MRMC and NIST visits are schedule for June 27-29
- The NIH-NASA proposal timeline suggests that October 1 is the proposal due date [p. 21, http://grants.nih.gov/grants/funding/phs398/398instr.pdf]

ITEM 1: Site Visits

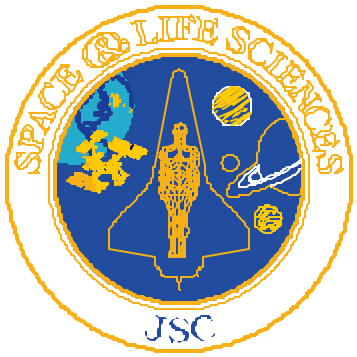
WHO SHOULD GO?

- Each site visit contingent should consist of:
  - 2 or more Civil Servants from SD, who are willing to represent the needs of disciplines and labs other than their own
  - 2 contractor personnel from SD
  - Participants from SF, SN, etc., as interested
  - NSBRI representatives, as interested
  - 1 representative from the ATM
- We suggest that these representatives should:
  - include someone who can present a 30 minute overview of JSC needs
  - have an interest in using a technology or capability (described in the handout package) to generate a NIH/NASA proposal
- To conserve CS travel funds, we suggest that the Advanced Technology Management Team be represented by Don Stilwell on the ORNL trip and by Alyssa Mueller to on the NIST/Ft Detrick trip

ITEM 1: Site Visits

OUTCOMES

- ATM will generate a matrix of technology needs that will be assessed during each site visit
- The Technology Transfer Office has implemented a trip report system, by which we can track critical technologies, unique facilities, and valuable contacts located during these trips
  - This is based on the Innovations 2000 web-based system, and will transfer seamlessly into this database
- ATM will follow up on the site visits with action items and reassessments



There will be ever-increasing emphasis on more and better relations between the various agencies of the US government.

We think that these visits will be the first step in the right direction.

ITEM 2: SmartSystems 2000

We are planning a new conference: SmartSystems 2000

www.smart.systems.org

Co-Sponsors and Host

- Co-sponsored by NASA, the Department of Health Informatics at the University of Texas Health Sciences Center at Houston (UTHSC-H), and NSBRI
- NASA participants include JSC EX, ER, SD, and SL, and
- Hosted by the non-profit Institute for Advanced Interdisciplinary Research (IAIR)

Conference Topics and Attendance

- Two continuous sessions: Space Applications and Medical Applications, modeled after the successful NanoSpace 2000 conference
- Currently, we expect about 250 conference attendees, with as many as 400
- Abstracts must be submitted by June 21; please visit the conference website for additional information and session topics

Timeframe and Milestones

- Scheduled for September 6-8, 2000 at the Naussau Bay Hilton
- The Call for Abstracts has been emailed to approximately 10000